REMARKS

Claims 1-10, 12 and 13 are pending in the present application. No claims have been added, deleted or amended. Reconsideration and allowance of the claims is respectfully requested in view of the following remarks.

Claim Rejections Under 35 U.S.C. § 112, First Paragraph

Claims 1-10, 12, and 13 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not conveyed in the Specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. In particular, the Examiner alleges that the Specification does not provide support for the claim limitation "at least intermittently" in describing the time period for the relative movement between the surface to be coated and the dispersion bath. The Examiner goes on to provide the definition of intermittently as "not continuous" and states that the phrase "at least intermittently" embraces continuous relative movement. The Examiner alleges "Applicants' specification, as originally filed did not provide support for continuous movement" (Paper 23, Page 2). Applicants respectfully disagree.

In the present Specification, on Page 3, second paragraph, the relative movement between the surface to be coated and the dispersion bath is described as "at least for a time". Claim 1 as originally filed described the relative movement as "at least from time to time". Applicants submit that the phrases "at least for a time" and "at least from time to time" embrace both intermittent or not continuous movement as well as continuous movement. Applicants contend that the specification as filed provides ample support for "at least intermittently". The Specification merely requires that there be relative movement between the surface to be coated and the dispersion bath for some period of time.

Claims 1-10, 12, and 13 stand rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to provide an enabling disclosure. In particular, the Examiner alleges that the Specification as filed does not provide support for "at least intermittently" to the extent that this phrase includes a motion which is continuous. The Examiner first cites the Specification on Page 3, paragraph 2 (not Page 2 as stated in the Office Action) and states

that the phrase "at least for a time" "is undefined since time can be infinitesimal or infinite" (Paper 23, Page 3). The Examiner then cites the Specification on Page 4, last paragraph which states "The plates were all turned every half hour in the bath and moved up and down from time to time in order to produce a relative movement between the surface and the dispersion bath". The Examiner then mistakenly concludes that the "references suggest a relative movement that is, at best, performed occasionally and not on a continuously" (Paper 23, Page 3). Applicants disagree with the Examiner.

Applicants submit that there is nothing about the phrase "at least for a time" that eliminates the possibility of continuous movement. When read as a whole, the Specification describes a relative movement between the surface to be coated and the dispersion bath the purpose of which is to keep the boron particles in agitation, or to keep them dispersed in the dispersion bath. The relative movement is an alternative to standard techniques such as recirculation or pumping which require use of a recirculation or pumping unit which can wear out over time. As specifically described on Page 4, paragraph 2 of the Specification, "relative movement, on one hand, achieves continuously good mixing or repeated mixing of the dispersion, and on the other hand, directly taking the dispersion to the surface to be coated". This statement clearly embraces both continuous mixing as well as repeated or intermittent mixing. One of skill in the art, when reading the Specification as a whole, would understand that the relative movement may be carried out in a continuous or not a continuous manner so long as the boron particles are maintained in a dispersion. The relative movement may be continuous or not continuous so long as the boron particles are flooded in the dispersion bath. Regarding the Example on Page 4 cited by the Examiner, this is merely one experiment illustrating the method and should not be construed as limiting the claims in any way.

Applicants thus submit that the Specification as filed provides support for the claim limitation "at least intermittently" and is enabled for this limitation. Applicants respectfully request reconsideration and withdrawal of the rejections under 35 U.S.C. § 112, first and second paragraphs.

Claim Rejections Under 35 U.S.C. § 102(b)

Claim 13 stands rejected under 35 U.S.C. § 102(b), as allegedly anticipated by EPO Publication EP 55,679 to Baburek ("Baburek").

Claim 13 is directed to a shielding element having a coating for absorbing neutrons created in a nuclear reaction of radioactive materials, the coating manufactured by a method comprising providing a basic material forming a shielding element; providing a dispersion bath whereby a dispersion of the dispersion bath comprises nickel and boron and/or compounds of boron; contacting the shielding element at least partly with the dispersion in the dispersion bath thereby providing a coating wherein boron and/or compounds of boron are embedded in a nickel matrix on the contacted surface of the shielding element and providing at least intermittently a relative movement between the surface to be coated and the dispersion bath during the coating process; and separating the shielding element from the dispersion bath; and wherein said base material formed by an inorganic material and said coating has more than 20% by volume of boron and/or compounds of boron thereof embedded in a nickel matrix.

Baburek discloses a box for underwater storage of irradiated nuclear fuel assemblies. The box includes a coating (I) consisting of boron carbide particles embedded in a nickel binder and a continuous layer (II) of nickel which covers the coating (I). Baburek teaches forming the coating (I) with a plasma torch using boron carbide powder grains coated with nickel. To obtain the boron carbide layer, it is necessary to have a plasma atmosphere surrounding the area where the nickel-bound boron carbide particles will be fixed on the continuous layer (II). Baburek thus disclosed a two-layer structure in which one layer is a layer of boron carbide particles in a nickel binder and a second layer is a nickel layer. There is no suggestion in Baburek that one layer may be used in isolation.

In making the rejection, the Examiner alleges that the product disclosed in Baburek is identical to the presently claimed product because Baburek discloses a shielding element having a boron carbide content of 50 wt.% in the nickel matrix. Applicants respectfully disagree.

To anticipate a claim under 35 U.S.C. § 102, a single source must contain all of the elements of the claim. *Lewmar Marine Inc. v. Barient, Inc.*, 827 F.2d 744, 747, 3 U.S.P.Q.2d

1766, 1768 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 1007 (1988). Moreover, the single source must disclose all of the claimed elements "arranged as in the claim." *Structural Rubber Prods. Co. v. Park Rubber Co.*, 749 F.2d 707, 716, 223 U.S.P.Q. 1264, 1271 (Fed. Cir. 1984).

Present Claim 13 claims a coating wherein boron and/or compounds of boron are embedded in a nickel matrix. A cross-cut through the coating would reveal a substantially continuous composition. The coating of Baburek is essentially a sandwich-type structure in which a boron carbide-nickel layer is coated with a nickel layer. A cross-cut through the coating of Baburek would reveal a sandwich-type structure with layer having different compositions. Thus, the presently claimed coating is not identical to the coating described in Baburek.

For at least the foregoing reasons, reconsideration and withdrawal of the rejection under 35 U.S.C. § 102 (b) are requested

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-10, 12 and 13 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over EPO Publication EP 55,679 to Baburek ("Baburek") in view of U.S. Patent No. 4,238,299 to Wang ("Wang").

Claims 1-10, and 12 are directed to a method for producing a coating for absorbing neutrons created in a nuclear reaction of radioactive materials, the method comprising providing a basic material forming a shielding element; providing a dispersion bath whereby a dispersion of the dispersion bath comprises nickel and boron and/or compounds of boron; contacting the shielding element at least partly with the dispersion in the dispersion bath thereby providing a coating wherein boron and/or compounds of boron are embedded in a nickel matrix on the contacted surface of the shielding element; providing at least intermittently a relative movement between the surface to be coated and the dispersion bath during the contacting process; and separating the shielding element from the dispersion bath. As described above, Claim 13 is a product by process claim. Claims 1 and 13 include the following limitation: "providing a dispersion bath whereby a dispersion of the dispersion bath comprises nickel and boron and/or compounds of boron".

Baburek discloses a box for underwater storage of irradiated nuclear fuel assemblies. The box includes a coating (I) consisting of boron carbide particles embedded in a nickel binder and a continuous layer (II) of nickel which covers the coating (I). Baburek teaches forming the coating (I) with a plasma torch using boron carbide powder grains coated with nickel. The coating method disclosed in Baburek is thus a physical method. To obtain the boron carbide layer, it is necessary to have a plasma atmosphere surrounding the area where the nickel-bound boron carbide particles will be fixed on the continuous layer (II). Baburek does not disclose a dispersion bath and thus does not disclose relative movement between a surface to be coated and a dispersion bath.

Wang discloses a method for producing shielding elements containing boron carbide particles embedded in a copper matrix. Wang teaches that a tube of stainless steel is removably situated on the bottom of an electrolytic cell so as to be disposed in electrical contact with a cathode contact connected to a current source. (Column 3, lines 6-12). The cell is filled with "conventional copper electrolyte solution 24 containing copper ions" such that "[t]he entire cell 10 is filled to a level about anode 12...." (Column 3, lines 16-18). Anode 12 is connected to the current source. "[B]oron carbide particles 26 are introduced through funnel 14 *while agitating the electrolyte solution with the stirrers 16*." (Column 3, lines 20-22, emphasis added). A thin layer of copper is plated on the exposed upper surface of the tube (before or during the introduction of the boron carbide particles) to improve the bonding between the stainless steel and the layer to be built up on the tube surface. (Column 3, lines 24-27). "*[T]he stirrers 16 are [then] stopped to allow the [boron carbide] particles to settle onto the surface of the tube 18 while electroplating proceeds...*," thereby trapping the boron carbide particles in the copper plate. (Column 3, lines 29-31, emphasis added). As such, Wang teaches a method of electroplating boron carbide particles onto the tube by stopping agitation to allow the boron carbide particles to settle onto the tube. Thus, there is no dispersion of the boron carbide during the contacting process. Because there is no dispersion of particle, there can be no movement relative to a dispersion during the coating process. Further, in this embodiment, there is no movement of the surface to be coated during coating.

In another embodiment, a rotation of the tubes to be coated to expose the next face "after plating" is disclosed. (Column 4, lines 19-22). This process differs from the claimed process because the tube rotation does not occur during contacting with the electrolyte solution. As with the embodiment described above, there is also no dispersion of the boron carbide during the coating process.

In yet another embodiment, square tubes are arranged around the circumference of a rotatable drum filled with an electrolyte containing copper ions. (Column 4, lines 32-45). Boron carbide particles are introduced into the electrolyte and evenly distributed over the surfaces of the tubes by "first slowly rotating the assembly and then increasing the rotational speed gradually until the boron carbide particles settle evenly on the inside surface of the drum". (Column 4, lines 45-52). In another arrangement, the tube is mounted coaxially in the rotatable drum (Column 5, lines 4-9). The boron carbide particles "circulate and fall evenly onto the outside surfaces of the square tubing continuously". (Column 5, lines 16-20). In both cases, during the coating process, the boron carbide particles are not dispersed in the electrolyte, otherwise they would not settle on the surface to be coated. There is no dispersion of the boron carbide in these embodiment because the particles are added and simply fall onto the surface to be coated. Because there is no dispersion of particles, there can be no movement relative to a dispersion during the coating process.

In particular, the Examiner alleges that the "Wang discloses a dispersion bath manufacturing process for nuclear radiation shields including a relative movement provided at least intermittently (col. 4, 12-68, and col. 5, 4-32)". (Paper 23, Page 4). Applicants respectfully disagree.

The present claims include "providing a dispersion bath whereby a dispersion of the dispersion bath comprises nickel and boron and/or compounds of boron" and "providing at least intermittently a relative movement between the surface to be coated and the dispersion bath during the contacting process". Baburek does not teach a dispersion bath or a relative movement as presently claimed . Applicants maintain that Wang also does not teach a dispersion bath as presently claimed and thus does not cure the defects of Baburek.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art

relied upon, coupled with knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or to combine references; and that the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d 1016, 1023 (Fed. Cir. 1996).

Unlike Applicants' claimed invention, Wang and Baburek fail to teach a dispersion bath. As previously stated, Wang teaches the deposition of boron carbide resulting from the physical "settling out" of the boron carbide particles from the liquid phase of the electrolyte solution once agitation has ceased. In the embodiments of Wang where the tubes are rotated during coating, the boron carbide particles are not dispersed in the solution, but rather "settle[d] evenly on the inside surface of the drum" and then rotating the drum while electroplating copper (Column 4, lines 45-62), or alternatively the particles "fall evenly onto the outside surfaces of the square tubing continuously". (Column 5, lines 16-19). In none of these cases is a dispersion bath employed during the coating process. Thus, there is at least one element of the present claims that is not taught by either Baburek or Wang.

Moreover, there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references to arrive at Applicants' claimed invention. Baburek teaches application of a coating containing *nickel* and boron carbide by plasma torch which is a physical method. Wang teaches an electrochemical method of forming a coating containing *copper* and boron carbide. There is no teaching or suggestion in either Baburek or Wang that an electrochemical method such as that disclosed in Wang would be suitable for deposition of a nickel and boron carbide coating. Copper and nickel are different elements having different properties and a method which is suitable for use with copper is not necessarily suitable for use with nickel. Therefore, Applicants submit that there is no suggestion or motivation to combine Wang and Baburek.

There is further no expectation of success for using an electrochemical method as taught in Wang to form a nickel and boron carbide coating. The electroplating method for

depositing boron carbide particles onto the surface of a tubing taught in Wang is quite distinct from the plasma torch method for depositing boron carbide onto a casing taught in Baburek. That is, these methods have different parameters and working conditions, and are workable on different types of materials. Consequently, since Baburek teaches a method quite distinct from that taught in Wang, there is no expectation of success in utilizing the materials disclosed in Baburek in an electroplating method as disclosed in Wang. Thus, there is no expectation of success in combining Baburek and Wang.

Further, if one were to properly combine Baburek and Wang, one would obtain a sandwich type structure as in Baburek having a first layer containing nickel and boron carbide and a second layer containing nickel. This sandwich-type coating is not the coating structure obtained in the presently claimed methods.

Therefore, because neither Wang nor Baburek, either alone or in combination, teaches or suggests all of the claim limitations of Claims 1 and 13 (i.e., providing a dispersion bath), there is no motivation to combine, and no expectation of success, Applicants respectfully submit that a prima facie case of obviousness has not been established for these claims. Applicants, therefore, request reconsideration and withdrawal of the rejection of Claims 1 and 13.

Furthermore, because Claims 2-10, and 12 depend from Claim 1, and because claims that depend from a claim that is non-obvious are themselves non-obvious, Applicants assert that Claims 2-10 and 12 are non-obvious and respectfully request reconsideration and withdrawal of the rejection of Claims 2-10 and 12.

With respect to Claim 2, the Examiner cites Wang at Column 4, lines 48-59. Claim 2 relates to the method "wherein the relative movement is produced by moving the element to be coated through the dispersion bath". Because Baburek and Wang do not teach a dispersion bath, they do not teach movement of an element to be coated through a dispersion bath and do not render Claim 2 obvious.

With respect to Claim 3, the Examiner cites Wang at Column 4, lines 12-17 and Figures 1, 6 and 7. Claim 3 relates to a method "wherein the surface to be coated is arranged in a direction to the surface of the dispersion bath". Because Baburek and Wang do not

teach a dispersion bath, they do not teach arrangement in a direction to a surface of the dispersion bath and do not render Claim 3 obvious.

With respect to Claim 4, the Examiner cites Wang at Column 3, lines 19-22 and Column 4, lines 45-46. Claim 4 relates to a method "wherein a dispersion bath with boron carbide is used". Because Baburek and Wang do not teach a dispersion bath, they do not teach a dispersion bath with boron carbide and do not render Claim 4 obvious.

With respect to Claim 5, the Examiner alleges that it would be obvious to remove the carbon from the boron carbide compound. (Paper 23, Page 5). Claim 5 relates to a method "wherein a dispersion bath with boron in element form is used". Because Baburek and Wang do not teach a dispersion bath, they do not teach a dispersion bath with a boron in element form and do not render Claim 4 obvious. In addition, removing the carbon from the boron element would lead to a totally different chemistry. For example, boron carbide as a boron-carbon compound is an easy to handle compound which has been produced since about 1899 on a ton-scale. Elemental boron, on the other hand, is an expensive and dangerous to handle compound. It is thus not obvious to substitute elemental boron for boron carbide.

With respect to Claim 6, the Examiner alleges that "Baburek discloses a method for coating a shielding element with a boron-nickel layer using a plasma torch". (Paper 23, Page 5). Claim 6 relates to a method "wherein the coating is formed chemically". Formation with a plasma torch is a physical, not a chemical method. Baburek thus does not render this claim obvious as alleged by the Examiner.

With respect to Claim 7, the Examiner alleges that "Wang discloses electrolytic boron carbide deposition". (Paper 23, Page 5). Applicants disagree. Claim 7 relates to a method "wherein the coating is formed electrolytically". Wang discloses electrolytic deposition of copper through and electrolytically nonconductive boron carbide layer. Thus only the copper of Wang is deposited electrolytically. The current claim is directed to electrolytic deposition of the entire coating, not just one element.

With respect to Claim 8, the Examiner alleges that "the thickness of the coating is controlled by the quantity of coating material used and, therefore, involves only routine skill in the art". (Paper 23, Page 5). Claim 8 is directed to a method "wherein a coating 350 to 500 μm thick is produced". The thickness of the coating is dependent not only on the

materials used but also on the method used to produce the coating. Since Baburek and Wang do not appear to disclose the claimed coating thickness, it is unclear if their disclosed methods would be suitable to produce a coating having the presently claimed thickness.

With respect to Claims 9 and 10, the Examiner states that Baburek discloses a boron carbide content of 50 wt.% (Paper 23, Page 5). Present Claim 9 is directed to the method "wherein boron or boron carbide with more than 20% by volume is embedded in the nickel matrix". Present Claim 10 is directed to the method "wherein boron or boron carbide with more than 40% by volume is embedded in the nickel matrix". As stated previously, the methods of Baburek and Wang are different from the presently claimed methods because neither Baburek nor Wang discloses a dispersion solution as presently claimed.

With respect to Claim 12, the Examiner cites Wang Column 2, lines 58-61. Claim 12 is directed to a method "wherein the method is carried out in a glass tub". In the lines cited by the Examiner, Wang discloses a Lucite vessel not a glass vessel. Wang does not appear to disclose a glass vessel.

Regarding Claim 13, neither Wang nor Baburek discloses the presently claimed process or the product produced by the process. As discussed above, Baburek discloses a sandwich-type coating which is distinct from that which is presently claimed. There is no teaching or suggestion in Baburek of a substantially continuous coating as is produced by the presently claimed method. With regard to Wang, Wang does not disclose a coating containing nickel.

For at least the foregoing reasons, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a) are requested.

In light of the foregoing remarks, reconsideration by the Examiner is respectfully requested. It is believed that the foregoing remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Cantor Colburn LLP.

Respectfully submitted,

CANTOR COLBURN LLP

By Karen A. LeCuyer

Karen A. LeCuyer
Registration No. 51,928
CANTOR COLBURN LLP
55 Griffin Road South
Bloomfield, CT 06002
Telephone (860) 286-2929
Facsimile (860) 286-0115
Customer No. 23413

November 24, 2003